Solar models with metal-enhanced convective envelope

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Previous low-Z models, aiming at decreasing solar neutrino fluxes, usually employ unreliable low central heavy element abundance and do not satisfy the helioseismic constraints. However, many evidences show that in the early stage of evolution of the solar system the sun was surrounded by dense molecular cloud and might accrete a considerable amount of matter to enrich the heavy element abundance in the envelope. We investigate the effects of moderate heavy elements enhancement in solar convective envelope on the solar structure and p-mode oscillations properties. The results show that except for smaller neutrino fluxes than those of the standard model already found before, the metal-enhanced models are able to reproduce the surface helium abundance and depth of the convection zone that have been determined by seismic inversion. The p-mode frequencies of the metal-enriched models are higher than those of the standard model, and are in better agreement with the observations.

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